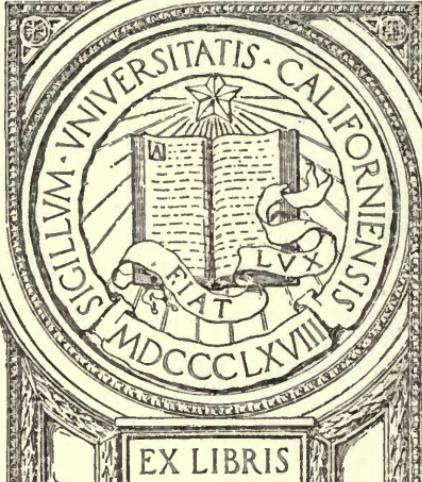


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THE FERNANDO FORMATION NEAR NEWHALL, CALIFORNIA  
by  
Walter A. English

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## THE FERNANDO FORMATION NEAR NEWHALL, CALIFORNIA

### Description of Species

by

*Echinorachinus excentricus*, Beck., var. minor, new sp.

*Athelina*  
*Chiene* ~~Walter~~ <sup>A.</sup> English.

*Chiene fernandoensis*, new sp.

*Picus nodiferus*, Gabb.

*Spirifer ellsmereensis*, new sp.

*Gemmularia ellsmereensis*, new sp. *Their form. s. decum.*

*Gemmularia bigibbosae* Gabb., var. *angulata*, new sp.

*Turris ellsmereensis*, new sp.

*Turris fernandoensis*, new sp.

AIR SHOWMAN JAMES W. HARRIS ROBERTSON OF TARRANT COUNTY

"d"

RECORDED IN A TESTIMONY

# INTRODUCTION THE FERNANDO FORMATION NEAR NEWHALL, CALIFORNIA

The age of certain fossiliferous sandstones overlying the Fernando Formation, in Ellsmere Canyon, has been investigated by Walter A. English for some years. The CONTENTS determined at different times in the Ellsmere Canyon Area, were as follows. It was with the hope of obtaining additional information on the age and relationships of these rocks that the writer took a study of them. This subject was treated for in the Historical Review by J. C. Merriam, and the work was carried on under his direction. The writer's field work was done during the months of January and June, 1912.

## PICO CANYON AREA LOCATIONS.

The work done here was limited to an area around

Pico Canyon, California, about thirty miles north-

of Los Angeles, the line of the Southern Pacific Railroad.

## DESCRIPTION OF SPECIES

*Echinarachinus excentricus*, Esch., var. minor, new var.

*Chione ellsmereensis*, new sp.

*Chione fernandoensis*, new sp., was found in a northwest

direction toward the Santa Susana Mountains, which point it enters a broad

west extension of the Santa Clara Valley.

*Cancellaria ellsmereensis*, new sp. about twelve

*Cancellaria tritonidae*, Gabb, var. angulata, new var.

*Turris ellsmereensis*, new sp.

*Turris fernandoensis*, new sp.

THE THERMADO FOUNDATION MURRAY CALIFORNIA

Mr. A. H. Miller

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Gymnospermae exsiccatae, Non var. var. minor, non var.

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Gymnospermae, non var.

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Schizellaceae, Gapp., var. subgigantea, non var.

Turritella effumeraria, non var.

Turritella transversalis, non var.

## INTRODUCTION

The age of certain fossiliferous sandstones overlying the granite in Ellsmere Canyon, near the San Fernando Pass, has been in doubt for some years. ~~This formation has~~ They have been determined at different times as Vaqueros, Monterey, and Fernando. It was with the hope of obtaining additional information on the age and relationships of these beds that the writer undertook a study of them. This subject was suggested for investigation by Doctor J. C. Merriam, and the work has been carried out under his direction. The writer's field work was done during parts of the months of January and June, 1912.

### LOCATION.

The work done by the writer was limited to an area around Ellsmere Canyon, near Newhall, California, about thirty miles northwest of Los Angeles on the line of the Southern Pacific Railroad. Ellsmere Canyon lies on the extreme northwest flank of the San Gabriel Range, just east of the San Fernando Pass, which separates the San Gabriel from its westward continuation in the Santa Susan Range. The canyon is about three miles long, and runs in a northwest direction toward Ellsmere Ridge, at which point it enters a broad southwest extension of the broad alluvium floored Santa Clara Valley. The general elevation of the Santa Clara Valley is about twelve hundred feet, while the highest point in the San Gabriel Range of this immediate area is thirty five hundred feet.

however, more probably based on the lithologic similarity to the beds in the eastern end of the Santa Susana Range, which he called Vaqueros. He speaks of a structural unconformity, with difference

## КОНСИСТОРИИ

The age of certain locomotoras syndrome involving the  
extremities in Hillemeier-Gaynor, near the San Fernando Pass, has been  
determined to be minimum 10 years. They have been found  
dead for some years. As a result, Montezuma, as  
well as Adelante, and Teresita, are considered to be  
the probable cause of death. The investigation  
is now being conducted by Doctor L. C. Merritt,  
and the results will be published in due course.

### LOCATION

The work done by the writer was limited to the study of the Hillmane Canyon, near Newell, California, about thirty miles west of Los Angeles on the Southern Pacific Railroad. The Hillmane Canyon lies on the extreme northern limit of the San Gabriel Range, which separates the San Gabriel River from the San Bernardino Mountain range. The canyon is about three miles long, and runs in a northwesterly direction toward Hillmane Ridge. The country is sparsely populated, and there is a sparse growth of scrubby vegetation, mainly chaparral, with some oaks and manzanita. The soil is a light brown color, and the surface is covered with a thin layer of fine sand. The bedrock consists of a series of horizontal layers of rock, with some thin layers of shale and sandstone. The rocks are mostly light-colored, with some darker layers, and are generally well-drained. The climate is dry and warm, with temperatures ranging from about 50° F. in winter to about 80° F. in summer. The rainfall is relatively low, with an average of about 15 inches per year.

## HISTORICAL REVIEW.

George H. Ashley<sup>1</sup> who visited the locality of the San Fernando

<sup>1</sup> Ashley, G.H., The Neocene Stratigraphy of the Santa Cruz Mts. Proc. Cal. Acad. of Sci., Ser. 2, vol. 5, p. 337, 1895.

Pass in 1894, says of this region: "At the San Fernando tunnel in Los Angeles county the beds that have been considered as Niocene of the Monterey Series are overlaid conformably by a series of calcareous sandstones and conglomerates which are quite fossiliferous." He made a collection of twenty three determined species, of which fourteen, or sixty per cent. are living. He considered the formation as of the same age as the Lower Purissima.

In 1900 Ellsmere Canyon was visited by W. L. Watts,<sup>2</sup> who called

<sup>2</sup> Watts, W. L., Bull. Cal. State Min. Bureau, 1900, no. 19, p. 56. the oil yielding sandstones the lower portion of the Middle Niocene. He also found a point where the sandstones of the Middle Niocene were resting unconformably on "hard sandstones resembling the Neocene sandstones of the Sespe district." This particular locality was not found by the present writer.

During the years 1901-2 the region of the Santa Clara valley was investigated by G. H. Eldridge,<sup>3</sup> who mapped the lower sandstone

<sup>3</sup> Eldridge, G. H., U. S. G. S. Bull. no. 309, p. 17; 96-8. beds of Ellsmere Canyon as Vaqueros, and in the text speaks of their having a typical fauna of the Vaqueros. His age determination was, however, more probably based on the lithologic similarity to the beds in the eastern end of the Santa Susana Range, which he called Vaqueros. He speaks of a structural unconformity, with difference of dip and strike between the Fernando gravels and the underlying

## HISTORICAL REVIEW

Vaqueros in Ellsmere Canyon. 60 feet, as exposed in Ellsmere Canyon,

In the same bulletin Arnold gives a list of fossils from and Ellsmere Canyon which he calls of Middle Fernando age.

In 1910 R. B. Moran made a collection of fossils in Ellsmere Canyon. In a paper given before the Palaeontological Society, he considered the fauna as of Monterey age, because of certain Lower Miocene forms which he found.

fossil wood fragments, and STRATIGRAPHY. These beds are all stain-

The chief formation of the San Gabriel Range is the San Gabriel Granite, a complex of granitic rocks and schists which makes up the whole central part of the range. Arnold divides the San Gabriel

<sup>4</sup> Arnold, R. and Strong, A.M., Some Crystalline Rocks of the San Gabriel Mountains, Cal. Bull. Geol. Soc. Am., vol. 16, 1905, p. 188-9  
range into a southern Sierra Madre, and the main San Gabriel. He says "The Sierra Madre Range consists essentially of granodiorites and gneisses, with more acid areas in which the country rock is quartz-monzonite. The character of the rocks of the mountain area north of the Sierra Madres is considerably different from that of the latter. True biotite and rather coarse grained granodiorite, decidedly different in appearance from that of the southern range, are found in the northern mass." The west end of the San Gabriel Range is chiefly granodiorite, with gneiss and other schists.

The Fernando formation of this area is not less than three to four thousand feet thick, and was laid down upon an eroded surface of the San Gabriel Granite. The upper surface of the granite is generally somewhat decomposed. The basal ten to fifteen feet consists of subangular to rounded fragments of granite, with comminuted

Adventures in Hiilemane Canyon.

most difficult to find a living plant in Aridaria渝nusum from

Hiilemane Canyon which is only a mile or so to Middle Terreneboads.

In 1910 H. H. Morrison made a collection of fossils in Hiilemane

Canyon. In a basin near Peter Lake the Palaeontological Society, in

consideration of certain lower

Miocene forms which he found.

#### STRATIGRAPHY.

The first formation of the San Gavilan Range in the San Gavilan

Gravels, a complex of gravelly materials which makes up the

4

valley bottom just to the range. Among

valley bottom rocks the San Gavilan

Rocks of the San Gavilan, R. San Gavilan, A.M., Vol. 10, p. 188.

Gravels, some gravelly rocks, and the main San Gavilan.

He ranges into a southern Sierra Madre, and the main San Gavilan.

area "The Sierra Madre contains a variety of gravelly

and pebbly rocks in which the country rock is

seen to be composed of the gravels. The gravels

are derived from the mountains to the north

and the valley bottom contains gravelly

deposits. The gravelly

rocks are derived from the mountains to the north

and the valley bottom contains gravelly

deposits. The gravelly

rocks are derived from the mountains to the north

and the valley bottom contains gravelly

deposits. The gravelly

rocks are derived from the mountains to the north

shells. The lower 700 to 800 feet, as exposed in Ellsmere Canyon, is a coarse shale made up chiefly of rather angular fragments and some volcanic ash. None of the shale was found to be diatomaceous. Towards the upper part the shale becomes coarser, and grades into sandstone. These beds, especially in the lower part, contain hard round concretions from six inches to three feet in diameter. The concretions are fossiliferous, containing shells, mammal bones, fossil wood fragments, and teredo borings. These beds are all stained a chocolate color by petroleum, and in places the bitumen is abundant enough to form a cementing material. Near Ellsmere Ridge there are a number of brea deposits formed by oil seepages; and the Ellsmere Canyon oil wells drew their supply from these lower strata.

(cont) Stratigraphically above the fine sandstones and shales is a series of cross bedded alternating coarse sandstones and conglomerates. These strata are well exposed on the sides of Ellsmere Ridge, in Whitney Canyon just north of Ellsmere, in Placerita Canyon, and they extend for an unknown distance eastward along the northern flank of the San Gabriel Range. In Ellsmere Canyon the conglomerate consists of well rounded pebbles and boulders up to twelve inches in diameter of granitic, and less commonly of volcanic rocks. The pebbles are of all sizes, and grade down into the sand which fills the interspaces. The induration is slight, most samples can be broken between the fingers. The color is a light buff.

The lower sandstone and shale beds were called Vaqueros by Eldridge, and the two were considered to be structurally unconformable by him. The writer believes the entire series to be conformable. The relations of the two lithologic units are well shown on



the ridge to the north of Ellsmere Canyon. There is here an abrupt and striking change from a medium grained sandstone to an overlying very coarse conglomerate. The conglomerate is more resistant than the underlying sandstone which weathers out from under it, and causes it to stand out very prominently on the otherwise even slope of the ridge. On examining the actual contact, the conglomerate is seen to rest on the sandstone without any irregularity of the contact plane, and the sandstone grades up into the sandy matrix of the conglomerate. Farther west the conglomerate pinches out, and the change in lithology is not so abrupt. On Ellsmere Ridge strata typical of both the upper and lower divisions are interstratified.

The conglomerate has a strike of North  $50^{\circ}$  West, and dip  $12^{\circ}$  North, while the lower part of the sandstone, and the granitic surface on which it was deposited have strike North  $65^{\circ}$  West, dip  $20^{\circ}$  North. No difference in dip or strike was observed at the actual point of contact.

Along with the difference in strike there is a thinning out of the shaly beds toward the East, and the conglomerate comes to rest directly on the granite at the head of Whitney Canyon. The presence of such an overlap does not however preclude conformity. The lithologic character of the sandstones and shales indicates that they are probably of estuarine origin, and the conglomerates are fluvial delta deposits. In deposits of this character some irregularity is to be expected. The two different lithologic units are therefore considered to be conformable in this area. This collection contains twenty four species, of which thirteen are common to Ellsmere Canyon, and come from a

and the area around the bridge. The bridge is located at the confluence of the two rivers, and it is a major transportation route for the local population. The bridge is made of wood and has a single lane. It is approximately 50 meters long and 5 meters wide. The bridge is located in a rural area, and there are no other roads or bridges nearby. The bridge is an important part of the local infrastructure, and it is used by many people every day. The bridge is in good condition, but it is old and needs to be replaced. The replacement plan is currently being developed, and it is expected to be completed within the next few years. The new bridge will be made of concrete and will have a wider span. The new bridge will also be more durable and able to withstand harsh weather conditions. The new bridge will be a significant improvement for the local community, and it will help to reduce traffic congestion and improve access to the area. The new bridge will also provide better connectivity to the rest of the country. The new bridge will be a symbol of progress and development for the local community.

horizon which does not differ Faunally from that of the latter.

The principal fossil localities examined are within one hundred feet of the base of the sandy shale in Ellsmere Canyon.  
5  
U. C. Loc. No. 1601 N.W. quarter N.E. quarter S.E. quarter sec.

7 T. 3 north R. 15 west Mt. San Bernardino. In bed of canyon about hundred yards downstream from the granite contact.

U.C. Loc. 1602 about hundred yards east of 1601, up small gulch in N.W. quarter S.W. quarter of sec. 8. T 3 N R 15 W

U.C. Loc. 1603 Pico canyon one quarter mile to N.W. of Superintendent's house, near tank on top of ridge.

Many of the fossil layers are only a few feet above the granite.

Small collections of some of the species were made on Ellsmere Ridge, and in Grapevine Canyon on the south side of the San Fernando Pass. No fossils were found in the conglomerates.

The following species were collected by the writer. Of the fifty five species there are twenty three or 44 per cent. living. Some of the other forms show only slight differences from the living forms, and are evidently nearly related to them. The literature on the fauna of the Fernando formation is rather scanty, and there are a large number of forms which have not been found so far from any other locality than the present one.

Arnold divides the Fernando of the Santa Clara valley into three horizons. The lower Fernando fauna as given by him comes from five different localities and consists of thirty three species, of which seventeen are specifically identified, and of the latter there are ten found also in Ellsmere Canyon. The writer examined a collection in the California Academy of Sciences from a locality five miles north-east of Camulos, which is one of the five localities mentioned above. This collection contains twenty four species, of which thirteen are common to Ellsmere Canyon, and comes from a

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horizon which does not differ greatly from that of the latter.

Arnold's middle Fernando collection comes from Ellsmere Canyon, the same locality as the writer's collection. He collected thirty three species, of which thirty were identified, and of these seventeen are found in the Ellsmere Canyon faunal list of the writer.

His collection localities probably included one somewhat higher horizon than the others, where he found Pecten caurinus and Pecten parmleei. He regards the fauna as equivalent in age to the "typical fossiliferous portion of the Purissima and the lower part of the San Diego formation."

From the upper Fernando he gives lists from three localities. The first locality is north-west of Santa Paula, and is of a lower horizon than the other two; it has thirteen species which are found also at Ellsmere Canyon. The third locality is at Barlow's Ranch, and is from a Pleistocene horizon. There are only five species from the latter locality which are found also at Ellsmere Canyon.

Arnold's<sup>6</sup> work in the Santa Maria district led him to believe

<sup>6</sup> Arnold, Ralph, U.S.G.S.Bull. 322 p. 58

that "at least five, and probably six distinct horizons are recognizable in the Fernando by means of characteristic fossil faunas." His faunal list gives all the horizons together, although they extend from the miocene to the Pleistocene. There are seventy species, of which thirteen are found in Ellsmere Canyon. Most of the species which he gives are from the upper or Pleistocene horizon.

From the upper Fernando Pliocene, or lowest Pleistocene of Bath-house Beach, Santa Barbara, Arnold gives sixty five species,

Sus Dilego formatioe.

The following fossils were found near Mount Pleasant, a  
few miles west of the city. They are all from the Silurian.  
The first fossil is a large trilobite, probably a *Limulus*. It  
is about three inches long, and has a very distinct head  
and a long, narrow body. The second fossil is a small  
trilobite, probably a *Phacops*. It is about one-half inch  
long, and has a broad, flat head and a long, narrow body.  
The third fossil is a small trilobite, probably a *Phacops*. It  
is about one-half inch long, and has a broad, flat head and a long,  
narrow body.

82 . g 525 R&D U.S.G.S.Bull. 525 p

## Echinoides

Phacoides richthofeni Gabb

8

*Astrodespis fernandoensis* Pack. *Phacoides santacrucis* Arnold  
 of which only four are common to Ellsmere Canyon. The upper Fernando  
*Hemicrassis excentricus* Pack. *Cardium bicarinatum* Gould  
 horizon seems to be very distinct from the lower one.

Arnold's<sup>7</sup> faunal list from the Etchegoin contains 84 recogniz-

<sup>7</sup> Arnold, Ralph. U.S.G.S. Bull. 398 p. 125  
 able species, of which twelve are common to Ellsmere Canyon, besides  
*Cardium quadrigenarium* Conrad  
 other very closely related species. The Purissima in its lower  
*var. fernandensis* Arnold  
 faunal zone has eight species common to Ellsmere Canyon. The  
 characteristic form *Pecten healyi* is found in both the Etchegoin  
 and Lower Purissima, and is believed to be characteristic of this  
 horizon. The form of *Pecten healyi* found in the Upper Purissima,  
*var. ellsmersis* new var.  
 and in the San Diego formation is somewhat thinner, and has the  
 ribs less raised. The Lower Purissima, and the Etchegoin are taken  
 to be the Northern California equivalents in age of the Ellsmere  
 Canyon fauna.

*Chrysodonus* sp.?

In conclusion it may be stated that there is a characteristic  
 fauna developed in the lower part of the Fernando, of which  
 Ellsmere Canyon, Pico Canyon, the locality northwest of Camulos,  
 and Mt. San Cayetano are examples. In the standard time scale this  
 horizon is near the line between the uppermost Niocene and the  
 lower Pliocene.

*Pecten ashleyi* Arnold*Gyrineum ellsmersensis* new sp.*Pecten healyi* Arnold*Mitra idae* Dall*Pecten cerresensis* Gabb*Nassa parpinguis* Hinds*Pecten* sp.? small*Neverita recluziana* Petit*Phacoides acutilineatus* Conrad*Pachypoma biangulata?* Gabb*Phacoides nuttali* Conrad*Polynices galianoi* Dall*Siphonalia helletti* Forbes*Trophon* sp.?*Turritella cooperi* Carpenter

of which only took the common of Hithamet Gauou. The upper Lembur  
portion was derived from the lower one.

48 recordings of the Hesperobius fauna from the Lower Pliocene  
Aridoid, a fauna consisting of the same species as the Upper

Aridoid, Rathy. U.S.G.S. Bull. 368 p. 152

species found in the Hesperobius fauna of Hithamet Gauou, particularly

those which were originally described by Böse.

The fauna of Hithamet Gauou, the Lower Pliocene, consists

of the following species found in both the Hesperobius

and Lower Pliocene, and of those described by Böse

and found in the Upper Pliocene.

and found in the Upper Pliocene, and was the

same fauna as the Lower Pliocene, and the Hesperobius fauna

was the same as the Hesperobius fauna of the Lower Pliocene.

In conclusion it may be stated that there is a considerable difference

between the fauna of the Lower Pliocene, to which

Hithamet Gauou, Pico Gauou, the Jocotita formation of Guanacaste,

and Mt. San Cayetano the same time consist

of the same fauna as the Upper Pliocene and the

Lower Pliocene.

Echinoidae	Phacoides richthofeni Gabb	10
Astrodapsis fernandoensis Pack	Phacoides santaecrucis Arnold	
Echinarachinus excentricus Esch.	Solen sicarius Gould	
var. minor new variety		
Although the area of Pico Canyon	Tellinidae Dall	first oil
Pelecypoda	Venericardia californica Dall	
producing localities in the state,		
Amiantis callosa Cpr.	Casteropoda	near the centre
Arca trilineata Conrad	Amphissa sp.? mainly conformably	
Cardium quadrigenarium Conrad	Dathytoma carpenteriana Gabb	Santa
overl var. fernandoensis Arnold	var. fernandoana Arnold	
Cardium sp.? from Pico canyon	Bittium cf. asperum Gabb	writer has
Chione ellsmereensis new species	Calyptae filosa Gabb	of the Pico
Chione fernandoensis new species	Cancellaria ellsmereensis new sp.	
Cryptomya californica Conrad	Cancellaria tritonidae Gabb	
Dosinea ponderosa Gray	var. ellsmereensis new var.	
Leda taphria Dall chocolate colored, silk Arnolded and slightly	Cancellaria sp.? near fernandoensis	
Macoma indentata Cpr.	Chrysodomus arnoldi Rivers	
Macoma sp.? pressure so as to break Chrysodomus sp.? jointed. These		
Marcia subdiaphana Cpr.	Conus californicus Hinds	
Metis alta Conrad	Crepidula princeps Conrad	
Modiolus rectus Conrad	Cypraea fernandoensis Arnold	first
Mytilus sp.? coarse beds entirely Drillia fernandoensis new sp. and		
Nucula castrensis Hinds	Ficus nodiferus Gabb	
Panopea generosa Gould	Gyrineum ellsmereensis new sp.	
Pecten ashleyi Arnold	Mangilia sp.? being near the axis	
Pecten healyi Arnold	Mitra idae Dall	
Pecten cerrosensis Gabb	Nassa perpinguis Hinds although	
Pecten sp.? small exposed, due to	Neverita recluziana Petit	
Phacoides acutilineatus Conrad	Pachypoma biangulata? Gabb absence	
Phacoides nuttali Conrad	Polynices galianoi Dall	
	Siphonalia kelletti Forbes	
	Trophon sp.?	
	Turitella cooperi Carpenter	
	Turris fernandoensis new sp.	



The lithologic successions in Pico Canyon as in Killmear Canyon, where the sandstones are fossiliferous. The two areas. Although the area of Pico Canyon was one of the first oil producing localities in the state, the only account of the geology of the area is that of Eldridge. He mapped the beds near the centre of the Pico anticline as Vaqueros, which was seemingly conformably overlain by Fernando gravels. From a hasty examination of the Santa Susana mountains from Pico canyon to San Fernando pass the writer has come to the conclusion that the beds which form the axis of the Pico anticline are part of the Fernando series, and are not Vaqueros.

#### Pelecypoda

#### Stratigraphy.

Lithologically the strata is the axis of the Pico anticline are fine grained, chocolate colored, oil stained and slightly indurated sandstones and sandy shales, which have in places been affected by pressure so as to become spheroidal and jointed. These beds are only 400 or 500 feet thick, above which the finer beds are interstratified with gravels and conglomerates, which latter become gradually more abundant, until about 2500 feet above where they first appeared the coarse beds entirely replace the fine sandy shales and sandstones.

*Turitella cooperi* Cyp.

On the north limb of the anticline the beds dip to the north at angles of from  $20^{\circ}$  to  $70^{\circ}$ , the steeper dips being near the axis of the anticline and the lesser ones at the edge of the valley. At no place was any structural evidence of unconformity found, although the section is well exposed, due to the steep slopes, and the absence of vegetation.

Pico Canyon Area

### Introduction.

The first cut to one acre was made at Pico Canyon in the year 1890 by the Los Angeles Land Company to the south of the project. This was followed by a second cut of six acres in 1892, which was known as "Admiral's Cut". The third cut was made in 1894, which was known as "General's Cut". The fourth cut was made in 1896, which was known as "General's Cut". The fifth cut was made in 1898, which was known as "General's Cut". The sixth cut was made in 1900, which was known as "General's Cut". The seventh cut was made in 1902, which was known as "General's Cut". The eighth cut was made in 1904, which was known as "General's Cut". The ninth cut was made in 1906, which was known as "General's Cut". The tenth cut was made in 1908, which was known as "General's Cut". The eleventh cut was made in 1910, which was known as "General's Cut". The twelfth cut was made in 1912, which was known as "General's Cut". The thirteenth cut was made in 1914, which was known as "General's Cut". The fourteenth cut was made in 1916, which was known as "General's Cut". The fifteenth cut was made in 1918, which was known as "General's Cut". The sixteenth cut was made in 1920, which was known as "General's Cut". The seventeenth cut was made in 1922, which was known as "General's Cut". The eighteenth cut was made in 1924, which was known as "General's Cut". The nineteenth cut was made in 1926, which was known as "General's Cut". The twentieth cut was made in 1928, which was known as "General's Cut". The twenty-first cut was made in 1930, which was known as "General's Cut". The twenty-second cut was made in 1932, which was known as "General's Cut". The twenty-third cut was made in 1934, which was known as "General's Cut". The twenty-fourth cut was made in 1936, which was known as "General's Cut". The twenty-fifth cut was made in 1938, which was known as "General's Cut". The twenty-sixth cut was made in 1940, which was known as "General's Cut". The twenty-seventh cut was made in 1942, which was known as "General's Cut". The twenty-eighth cut was made in 1944, which was known as "General's Cut". The twenty-ninth cut was made in 1946, which was known as "General's Cut". The thirtieth cut was made in 1948, which was known as "General's Cut". The thirty-first cut was made in 1950, which was known as "General's Cut". The thirty-second cut was made in 1952, which was known as "General's Cut". The thirty-third cut was made in 1954, which was known as "General's Cut". The thirty-fourth cut was made in 1956, which was known as "General's Cut". The thirty-fifth cut was made in 1958, which was known as "General's Cut". The thirty-sixth cut was made in 1960, which was known as "General's Cut". The thirty-seventh cut was made in 1962, which was known as "General's Cut". The thirty-eighth cut was made in 1964, which was known as "General's Cut". The thirty-ninth cut was made in 1966, which was known as "General's Cut". The fortieth cut was made in 1968, which was known as "General's Cut". The forty-first cut was made in 1970, which was known as "General's Cut". The forty-second cut was made in 1972, which was known as "General's Cut". The forty-third cut was made in 1974, which was known as "General's Cut". The forty-fourth cut was made in 1976, which was known as "General's Cut". The forty-fifth cut was made in 1978, which was known as "General's Cut". The forty-sixth cut was made in 1980, which was known as "General's Cut". The forty-seventh cut was made in 1982, which was known as "General's Cut". The forty-eighth cut was made in 1984, which was known as "General's Cut". The forty-ninth cut was made in 1986, which was known as "General's Cut". The五十th cut was made in 1988, which was known as "General's Cut". The fifty-first cut was made in 1990, which was known as "General's Cut". The fifty-second cut was made in 1992, which was known as "General's Cut". The fifty-third cut was made in 1994, which was known as "General's Cut". The fifty-fourth cut was made in 1996, which was known as "General's Cut". The fifty-fifth cut was made in 1998, which was known as "General's Cut". The fifty-sixth cut was made in 2000, which was known as "General's Cut". The fifty-seventh cut was made in 2002, which was known as "General's Cut". The fifty-eighth cut was made in 2004, which was known as "General's Cut". The fifty-ninth cut was made in 2006, which was known as "General's Cut". The六十th cut was made in 2008, which was known as "General's Cut". The sixty-first cut was made in 2010, which was known as "General's Cut". The sixty-second cut was made in 2012, which was known as "General's Cut". The sixty-third cut was made in 2014, which was known as "General's Cut". The sixty-fourth cut was made in 2016, which was known as "General's Cut". The sixty-fifth cut was made in 2018, which was known as "General's Cut". The sixty-sixth cut was made in 2020, which was known as "General's Cut". The sixty-seventh cut was made in 2022, which was known as "General's Cut". The sixty-eighth cut was made in 2024, which was known as "General's Cut". The sixty-ninth cut was made in 2026, which was known as "General's Cut". The七十th cut was made in 2028, which was known as "General's Cut". The seventy-first cut was made in 2030, which was known as "General's Cut". The seventy-second cut was made in 2032, which was known as "General's Cut". The seventy-third cut was made in 2034, which was known as "General's Cut". The seventy-fourth cut was made in 2036, which was known as "General's Cut". The seventy-fifth cut was made in 2038, which was known as "General's Cut". The seventy-sixth cut was made in 2040, which was known as "General's Cut". The seventy-seventh cut was made in 2042, which was known as "General's Cut". The seventy-eighth cut was made in 2044, which was known as "General's Cut". The seventy-ninth cut was made in 2046, which was known as "General's Cut". The eighty-thousandth cut was made in 2048, which was known as "General's Cut".

### Geology.

The geological formations of the area consist of the following:

- 1. The bedrock consists of metamorphic rocks, primarily schist and gneiss, which are folded and foliated.
- 2. The overlying sedimentary rocks include shale, sandstone, and dolomite, which are deposited in marine environments.
- 3. The surface soils are derived from the weathering of the bedrock and are characterized by high clay content and low infiltration rates.
- 4. The topographic features of the area are dominated by steep slopes and ridges, with numerous gullies and washes developed on the bedrock surface.
- 5. The vegetation is primarily composed of coniferous forests, with some deciduous trees and shrubs scattered throughout the landscape.
- 6. The water resources are limited, with most precipitation occurring as snowfall during the winter months, which melts rapidly in the warm summer temperatures.
- 7. The climate is characterized by high temperatures and low humidity, with annual average temperatures ranging from 50°F to 70°F and annual precipitation ranging from 10 inches to 20 inches.
- 8. The soil types are varied, including heavy clay soils, loamy soils, and sandy soils, depending on the underlying bedrock and topographic conditions.
- 9. The presence of groundwater is indicated by several springs and seepage areas, which are located in the more permeable zones of the bedrock.
- 10. The overall geological history of the area is characterized by a long history of tectonic activity, with significant mountain building and erosion processes occurring over millions of years.

The lithologic succession is the same in Pico Canyon as in Ellsmere Canyon, where the sandy shales are fossiliferous. The two areas are only a few miles apart, and the beds can be traced as practically continuous between the two areas. It is thus very probable that the Pico Canyon sandy shales are of the same age as those in Ellsmere Canyon, and are of Fernando and not Vaqueros age.

### Fauna

Similar in general to the recent *Bolinorachinus*  
The following collection was made from a fine grained sandstone  
interstratified with gravels, near the upper limit of the fine  
grained beds

Pelecypoda	Gasteropoda
Cardium quadriogenarium Conrad	Bulla, sp.?
Cardium, sp.?	Calyptrea filosa Gabb
Chione fernandoensis, new sp.	Chrysodomus arnoldi Rivens
Leda taphria Dall	Fusus cf. portolaensis
Pecten sp.? like pabloensis	Nassa perpinguis Hinds
Solen sicarius Gould	Neverita sp.?

This variety resembles *S. excentricus*. Specimens similar to *S. gallianoi* Dall were present in the University of California collection.

(Santa Clara valley), and from the Tenth Street Well, San Diego. This fauna is essentially of the same age as that collected from Ellsmere canyon, although it is from beds which appear to be about 1500 feet stratigraphically above the latter horizon.

Himalayan Gharial, and the Ganges and Indus of Asia.

the same benefits with a more effective collection of information and better  
ability to timely respond to user needs, always with better accountability.

*benignus* *benignus* *benignus* *benignus* *benignus* *benignus*

Bejacobobs Gasteroboeas

Catálogo da Biblioteca Municipal Getúlio Vargas  
Búfalo, 06-09-1998

Geological Survey of Canada, 1976, Geology of the Gaspé Peninsula, Quebec, Vol. 1, Part 1, Regional Geology, 1:500,000 scale, Sheet 10, Gaspé.

Chloroformamidine River  
Chloroformamidine River

Reas subsists still  
Name of botanist

Beispiel für die Spiegelung eines Messesberichtsmaßnahmen

Sofia Alessandra Gonçalves Melo de Oliveira

Experiments on the influence of the physical environment on the performance of the *Leucaspis* polyphloeae infestation DstI

Strengere Maßnahmen gegen die illegale Schließung von Unternehmen und Betrieben.

*Turritis glabra* Gr.

batesilico tant as egs emsa edt lo vifaitnesea ai smesl aint

from Millemele station, strongly abetted by wind which was better to

The spout 1200 feet above the surface shows the first horizon.

Chione ellsmmerensis new sp.

Pl. 1, fig. 1 and 2.

12

Shell large, outline rather rounded; dental formula  
Echinarachinus excentricus Esch. var. minor  
L.010101, second cardinal new var. fid; shell ornamented

Pl. 2. fig. 7.

by concentric lamellae which disappear on eroded specimens;  
radii similar in general to the recent Echinarachinus  
excentricus from which it differs as follows:—size smaller,  
and test thinner; tumid area in center of abactinal surface  
absent, the thickness decreasing gradually from the center to  
the edges which are very thin; excentricity of apical system  
varies from 1:1 to 1:2.4 and averages 1:2.0, which is  
somewhat greater than in the living E. excentricus. In this  
respect the present form is somewhat similar to E. gibbsi,  
which, however, is more excentric, and which has the relative  
lengths, and the angles between the petals different. Similar  
to. This variety resembles immature specimens of E. excen-  
tricus. Specimens similar to the present form in the Univer-  
sity of California collection are marked from Burn's Ranch  
(Santa Clara Valley), and from the Tenth Street Well, San Diego.  
mm., width 12 mm.

51

Bioluminescence experiments were carried out at night in the field. The results are shown in Figure 5.

Chione ellsmereensis new sp.

14

Pl. 1, fig. 1 and 2.

Chione fernandoensis, new sp.

Shell large, outline rather rounded; dental formula

L.010101, second cardinal tooth bifid; shell ornamented

Shell small, sub-triangular, thick; lunule large, by concentric lamellae which disappear on eroded specimens; cordate, distinct, bounded by an impressed line; anterior radial sculpture of flat ribs developed by weathering; dorsal slope short, posterior dorsal slope long and only escutcheon a distinct flattened area, the radial sculpture very slightly convex; escutcheon broad and flat or slightly concave, ligamental channel equal in length to one third millimeters below the escutcheon; ligament deep seated; of posterior dorsal slope base roundly arcuate; shell marked lunule lanceolate, bounded by impressed line.

by concentric lamellae which become more prominent upon erosion of specimen, when they give it a corrugated appear-

ance; radially marked by numerous fine ribs. Compared to Chione securis this species is longer anteriorly, the escutcheon is narrower, and the lunule is of the same width but twice as long. It appears similar to

This species is common from the lower part of the a specimen from the lower Miocene at Calabasas, figured by Fernando formation. It was probably included under Chione Ralph Arnold as C. temblorensis, and which he says is similar succincta by Gabb, who lists the latter from the Fernando to, or possibly identical with a form found in the upper Pliocene. This species differs from other chiones by its Miocene.

small size, large broad lunule, lamellar structure, and broad escutcheon.

Altitude 75 mm.; latitude 95 mm., of which two thirds is posterior to the beak; diameter 45 mm.; lunule length 20 mm., width 12 mm.

Altitude 18 mm.; length 28 mm.; thickness 10.5 mm.; lunule length 6 mm., width 4 mm.

Chitone sierrense

• 5. I, like, I am

*Ficus nodiferus*, Gabb.

Chione fernandoensis, new sp.

Pl.

Pl. 1, fig. 4 and 5.

Shell pear shaped, with large body whorl; spire low, shell small, sub-triangular, thick; lunule large, body whorl forms two thirds width of spire; an upper and cordate, distinct, bounded by an impressed line; anterior lower angulation present, the former the more distinct, dorsal slope short, posterior dorsal sipe long and only shell ornamented with twelve very prominent nodes to each very slightly convex; escutcheon broad and flat or slightly concave; ligamental channel equal in length to one third of posterior dorsal slope; base roundly arcuate; shell marked with the lower; both the lower and upper nodes are by concentric lamellae which become more prominent upon elongated and have from one to three cusps which are formed erosion of specimen, when they give it a corrugated appearance; radially marked by numerous fine ribs.

This species is common from the lower part of the Fernando formation. It was probably included under Chione succincta by Gabb, who lists the latter from the Fernando Pliocene. This species differs from other chiones by its small size, large broad lunule, lamellar structure, and broad escutcheon.

Altitude 18 mm.; length 22mm.; thickness 10.5 mm.; lunule length 6 mm., width 4 mm. larger size, the maximum lengths being 120 and 60 mm., respectively; the spiral lines on F. nodiferus vary in width and show a tendency to be wavy, while those on F. kernianum

45

• ga wen , afamefueamene Chinese treasure

• 2 • 1948

... mm 81 abutitia  
... mm 25mm; tipocemea 10.2 mm

• *num + ntbkw* , *num ð ntbgnef elnum*

are very uniform; the former has generally only one ~~int~~ 15  
to each node of Ficus nodiferus, Gabb. two on each node of  
the lower angle, Pl. 1, fig. 5 and 8. two on the upper and  
two Shell pear shaped, with large body whorl; spire low,  
body whorl forms two thirds width of spire; an upper and  
lower angulation present, the former the more distinct;  
shell ornamented with twelve very prominent nodes to each  
whorl, these consist of two spiral rows of vertically places  
elongated nodes, the upper row being so spaced as to alter-  
nate with the lower; both the lower and upper nodes are  
elongated and have from one to three cusps which are formed  
where the heavy spiral lines cross the raised area of the  
node; shell marked by twelve to fifteen spiral lines, be-  
tween each of which are three finer lines of which the  
middle one is the wider; spiral lines crossed by numerous  
very fine longitudinal lines; mouth opening semi-circular  
to sub-triangular; outer lip thin; canal medium length,  
recurved.

This species is quite close to F. kernianum, cooper,  
of the Temblor formation, from which it differs as follows:--  
larger size, the maximum lengths being 120 and 60 mm., res-  
pectively; the spiral lines on F. nodiferus vary in width  
and show a tendency to be wavy, while those on F. kernianum

Wine collection gaps

• 85ms E. life, I. PI.

Kerria japonica is a woody vine and belongs to the Rosaceae family. It has alternate, elliptical leaves with serrated edges. The flowers are white or yellowish-white, arranged in cymes at the ends of branches. The fruit is a small, round drupe.

are very uniform; the former has generally only one point to each node on the upper angle, and two on each node of the lower angle, while the latter has two on the upper and two or three on the lower; in general the latter's nodes are vertically longer, and the cusps are more acutely pointed especially on the larger whorls.

Some specimens, especially the earlier whorls have the nodes small or nearly absent, and an oval cutline replaces the normal angulation of the body whorl. These resemble F. pyriformis, Gabb, very closely. As the shell grows larger the nodes and angulation increase in prominence until the mature shell shows only slight resemblance to F. pyriformis.

F. stanfordensis and Ficus sp.? from the Lower Miocene of Contra Costa County, both represented only by casts, appear similar to F. nodiferus as far as could be told. This species appears to be close to Ranella matthewsoni, from casts.

This species differs from Gabb's figure in smaller size, slightly more deeply impressed suture, and presence of nodes on angle. This species is listed by Gabb as from both Ellsmere and Pico Canyons.

Altitude 36 mm.; width 25mm.; altitude of spire 10mm.; mouth opening length 32 mm., width 15mm.; largest specimen altitude 120 mm.

४१

Cancellaria ellsmereensis, new sp.

17

Gyrineum ellsmereensis, new sp.

Shell fusiform. Pl. 2, fig. 1. ~~ted~~, whorls five to six,

slightly bucciniform, spire high, apex broken, whorls two present; suture deeply impressed, whorls rounding out below suture; varices prominent; two or three low rounded nodes on angle of whorl between each two successive varices; shell cancellated, marked by fourteen flat spiral lines on outer lip, and twenty on the inner lip of body whorl; these are crossed by numerous fine longitudinal lines; mouth opening oval equal in height to half the total height of restored shell; outer lip greatly thickened, spiral lines showing on the inner surface of lip; inner lip thinly encrusted, and showing spiral lines; canal short.

This species appears to be close to Ranella mathewsoni, Gabb. It differs from Gabb's figure in smaller size, slightly more deeply impressed suture, and presence of nodes on angle.

Altitude 28 mm.; width 20 mm.; thickness 14 mm.; mouth opening height 15 mm., width 8 mm.

• ga wen , siānqītēmāllé m̄wənlitv

Page 5

Cancellaria ellsmereensis, new sp.

19

Pl. 2, fig. 2.e, Gabb, var.

ANGULATA NEW VAR.

Shell fusiform, spire elevated, whorls five to six, slightly angulated below the suture; suture impressed, angulation absent on the body whorl; mouth opening narrow equal to half the height of shell; whorls ornamented with ten to twelve longitudinal ridges, on body whorl these become irregular in shape, and the angulation is absent; whorls show three or four extremely faint radial lines, which are absent in body whorl except for small area on posterior part of columella; outer lip thin, columella encrusted, smooth except for two acute plications anteriorly; canal short straight.

This species is similar to C. cooperi, Gabb, from which it differs by smaller size, absence of angulation on body whorl, and the irregular growth lines on body whorl.

Altitude 25 mm.; width 12mm.; mouth opening length equal to about half total height of shell, width 5 mm.

Gnathellaria sphaerulata

PI. 5, fig. 5

axis of evil afford, which elevates the spinal column. Spinal column is composed of vertebrae; each vertebra is formed by a body which bears no processes except a median process called the spine; this spine is directed forward and bears two processes called the transverse processes, which are directed laterally; these processes bear two small processes called the articular processes, which are directed backward and meet those of the adjacent vertebrae; the spaces between the articular processes are filled with a soft, elastic substance called intervertebral ligament.

Pl. 2 Fig. 3 and 4.

Shell small, fusiform, spire high, apex unknown, whorls four to five present Cancellaria tritonidae, Gabb, var. concave, angulata new var. whorls slightly convex below Pl. 1, fig. 3. whorl evenly convex; size medium, spire elevated, apex absent, three longitudinal ridges present whorls angulated below suture; ornamented by twelve transverse ribs on each whorl, the ribs forming shoulder nodes along the shoulder; lower part of the body whorl and concave outwardly in outline, and the vertical ridges are absent from this part; shell spirally ornamented by alternating coarser and finer lines; outer lip smooth, inner lip encrusted; canal short and straight, along suture, and This variety differs from C. tritonidae in smaller angular prominence of the vertical ridges, and greater angulation. In the angulation this variety resembles the earlier whorls of C. tritonidae. Turris coalingensis, from which it differs Altitude 20 mm.; width 17 mm.; a height of mouth, and the opening equal to half total height of shell. whorl and on columella. It differs from Mangilia tabulatus as figured by Arnald<sup>1</sup> from Bath-House Beach, Santa Barbara, by finer spiral ribbing and shorter canal.

Altitude 29 mm.; width 11 mm.; mouth opening height 17 mm., width 5 mm.; posterior canal width 2 mm., depth 3 mm.

四

*Classification techniques*, spp., var.  
submissis nov var.  
Pl. I, fig. 3.

Turris ellsmereensis, new sp.

## Pl. 2 Fig. 3 and 4.

Shell small, fusiform, spire high, apex unknown, whorls four to five present; angulated near suture, shoulder concave, whorls slightly convex below angle, body whorl evenly convex; longitudinal sculpture eleven to twelve prominent rounded ridges which slope slightly to the left, and are most prominent on upper part of whorl near angle, but are not present on the shoulder; shell spirally marked by two to three lines above and seven to eight lines below angle; body whorl and columella ornamented by twenty five spiral lines which are sometimes sub-equal and alternating; aperture narrow, outer lip thin and smooth, prominently reflected; posterior sinus deep along suture, anterior edge of the sinus parallel to the line of angulation; canal short curved slightly backwards from the aperture; columella smooth.

This species is close to Turris coalingensis, from which it differs by having spiral lines finer and more numerous, and no difference in coarseness of sculpture on body whorl and on columella. It differs from Mangilia tabulatus as figured by Arnold<sup>1</sup> from Bath-House Beach, Santa Barbara, by finer spiral ribbing and shorter canal.

Altitude 29mm.; width 11mm.; mouth opening height 17 mm.; width 5mm.; posterior canal width 2 mm., depth 3 mm.

as wen sianetemafie elittut

Fig. 5. The sun at

Turris fernandoensis, new sp.

Pl. 2, fig. 6.

Shell small fusiform, spire high, equal in height to the mouth opening; whorls five, roundly angulated, suture following line of angulation of preceding whorl; posterior canal on upper slope of body whorl, prominent, wide, triangular with angle of  $135^{\circ}$  between sides; lower part of body whorl and canal ornamented by faint spiral lines which may have been worn off of rest of whorl; mouth opening narrow; outer lip broken; columella simple; canal medium length, straight.

This species is similar in shape and size to Astyris richthofeni, but is longer anteriorly, and is distinguishable by the presence of anterior sinus.

Altitude 21 mm.; width 9 mm.; mouth opening height 11.5 mm., width 3.5 mm.

Fig. 7. Spiriferacanthus concentricus, Desh. var. minimus, var.

Fig. 8. Vicus nodiferus, Gabb, larger specimen showing the more prominent nodes and angulation.

Fig. 9. Astrodrapsis fernandoensis, Pack.

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Explanation of Plate 1.

All figures natural size.

- Fig. 1. Chione ellsmereensis, n. sp.
- Fig. 2. Same as fig. 1., showing hinge.
- Fig. 3. Cancellaria tritonidae, Gabb, var. angulata, new var.
- Fig. 4. Chione fernandoensis, n. sp. anterior view.
- Fig. 5. Same as fig. 4, view of left valve.

Explanation of Plate 2.

All figures natural size.

- Fig. 1. Gyrineum ellsmereensis, n. sp.
- Fig. 2. Cancellaria ellsmereensis, n. sp.
- Fig. 3. Turris ellsmereensis, n. sp.
- Fig. 4. Turris ellsmereensis, n. sp. side view.
- Fig. 5. Ficus nodiferus, Gabb.
- Fig. 6. Turris fernandoensis, n. sp.
- Fig. 7. Echinorachinus excentricus, Esch. var. minor, n. var.
- Fig. 8. Ficus nodiferus, Gabb. larger specimen showing the more prominent nodes and angulation.
- Fig. 9. Astrodapsis fernandoensis, Pack.

## Explanation of Plate 1

All figures natural size

Fig. 1. Chiono eilemataenia, n. sp.

Fig. 2. Same as fig. 1, wider.

Fig. 3. Coccolissis tritomoides, spp., var. medialisFig. 4. Chiono tenuisquamis, n. sp., narrower view

Fig. 5. Same as fig. 4, view of testis

## Explanation of Plate 2

All figures natural size

Fig. 1. Eurytemma eilemataenia, n. sp.Fig. 2. Coccolissis eilemataenia, n. sp.Fig. 3. Turritis eilemataenia, n. sp.,

narrower view

Fig. 4. Micra bogotensis, spp.Fig. 5. Turritis tenuisquamis, n. sp.Fig. 6. Hedistiscaquinquecostata, Hop., var. minor, n. sp.Fig. 7. Ticus medialis, spp., wider than normalFig. 8. Astrocabasis tenuisquamis, new























































































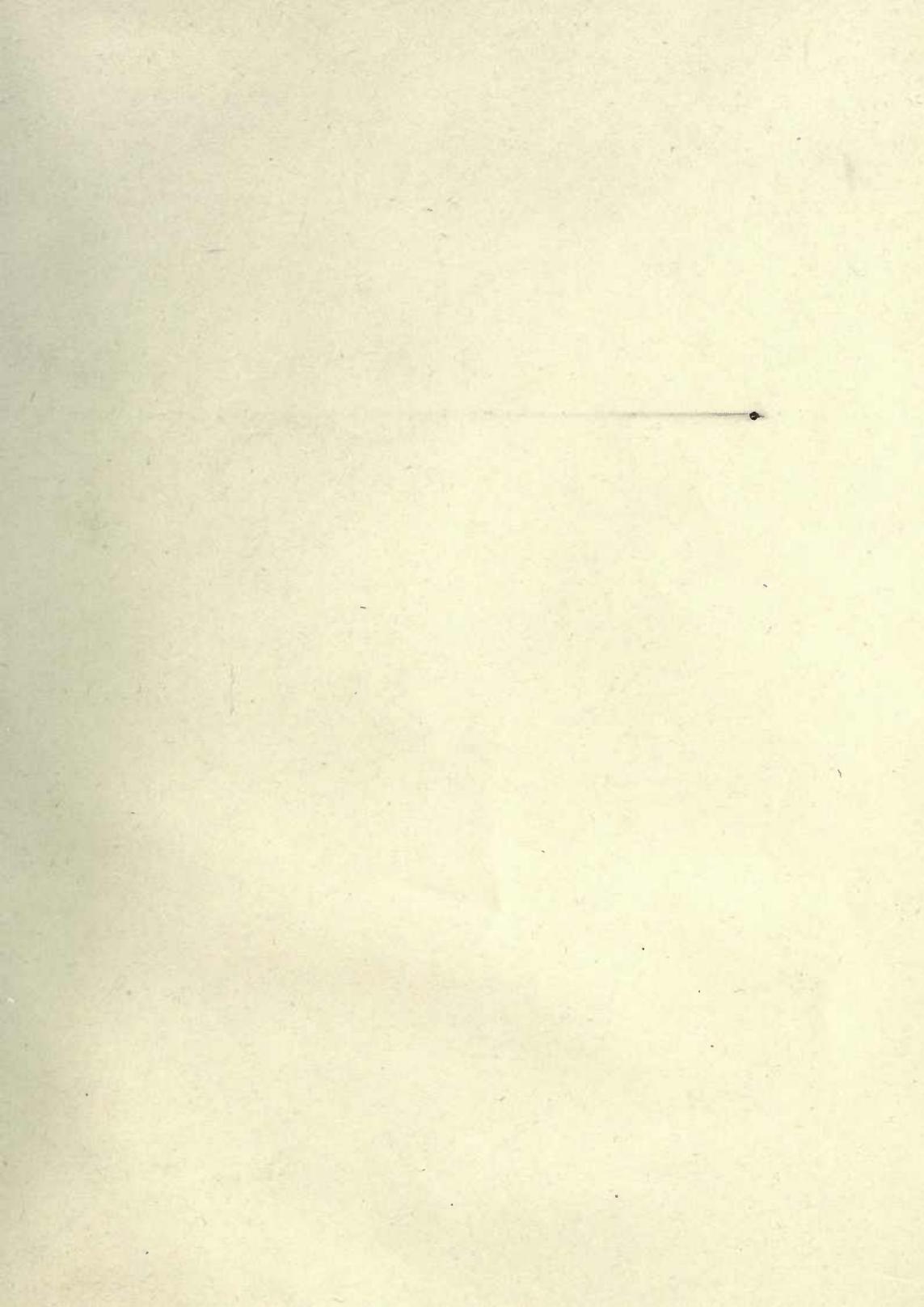


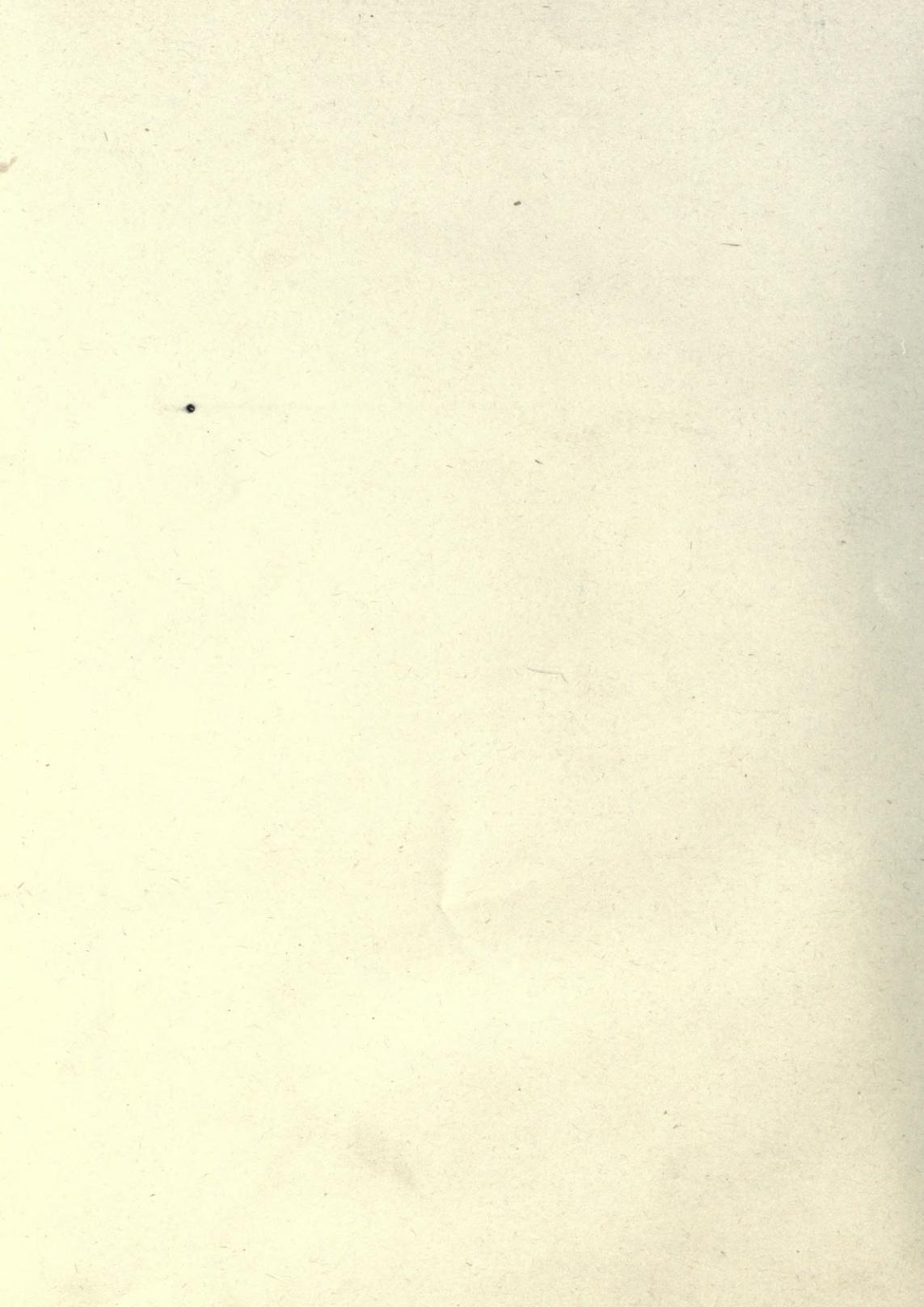




















































































































































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